

**1<sup>st</sup> Housing and Malaria Work Stream Meeting**  
**17.15-18.30, Thursday 20<sup>th</sup> January 2014**  
**Auditorium, ICRC, Geneva**

**Chair: Steve Lindsay**  
**Rapporteur: Lucy Tusting**

Michael Macdonald opened the meeting and gave a rationale for introducing housing to the VCWG.

***Electrostatic netting and eave tubes – Bart Knols, In2Care BV, The Netherlands***

Ongoing EU-funded research on electrostatic netting and eave tubes was presented. Insecticides can be bound to electrostatic netting, achieving good transfer of active ingredients to mosquitoes, up to 90% mortality after 24 hours and requiring lower insecticide concentrations than those used on insecticide-treated nets (ITNs). In Africa, houses are increasingly being built with metal roofs and brick walls replacing thatch and mud walls, and with closed eaves. A new intervention, comprising a PVC tube containing insecticide-treated netting inserted into closed eaves, has been observed to achieve high mosquito mortality. This intervention increases airflow into the home and reduces the quantity of insecticide required per house. The tubes can also be covered with wire netting to prevent rodent damage. Being at eave level, the tubes are unlikely to come into contact with humans, increasing possible bioavailability since more toxic actives can be used. An alternative to this intervention is to remove odd bricks and insert impregnated netting in their place.

*Discussion*

It was queried whether high humidity reduces the electrostatic effect; however efficacy was not observed to decline over a period of two months in field conditions with 60-80% humidity. The upfront cost of the intervention is the house modification but ongoing maintenance costs are low. Over a period of three years, cost per person per year is comparable with LLINs.

***The evidence supporting housing as a malaria intervention – Mariana Stephens, Habitat for Humanity, USA***

The vision of Habitat for Humanity (HFH) is a world where everyone has a decent place to live. HFH is increasingly approaching housing as a process, acknowledging that most people build incrementally. HFH has Housing Quality Standards to define the acceptable quality of a new or rehabilitated house, which were developed based on the United Nations Millennium Development Goals, International Residential Building Codes, UN-HABITAT and Sphere guidelines. These guidelines focus on five house features: design, durability, secure tenure, water and sanitation. The 2011 Shelter Report on Housing and Health, which had a chapter dedicated to malaria, concluded that interventions that combine health and housing are essential for long-term improvements in global health ([http://www.habitat.org/gov/take\\_action/shelter\\_report\\_2011.aspx](http://www.habitat.org/gov/take_action/shelter_report_2011.aspx)). More recently, a white paper has been drafted that reviews studies on 'mosquito proofing' housing around the globe and assesses whether improving housing can be an effective strategy today (Anderson L, Simpson D and Stephens M, 2014. Effective Malaria Control Through Durable Housing Improvements: Can we learn new strategies from past experience? Global Programs Department White Paper No. 1. Habitat For

Humanity, Atlanta). The Multisectoral Action Framework for Malaria considers housing improvements a viable multisectoral malaria intervention. Early studies helped spread the practice of screening houses in the United States and, more recently, studies in Malawi (Wolff et al 2001, BMJ), Bioko (Bradley et al 2013, PLoS One), Kenya (Atieli et al 2009, Malaria Journal), Ethiopia (Massebo & Lindtjorn 2013, Malaria Journal) and The Gambia (Lindsay et al 2003, TMIH; Kirby et al 2009, Lancet) have demonstrated the potential for improving homes to protect against malaria.

Future research issues include: (1) identifying the contexts (urban vs rural) where housing improvements can reduce malaria transmission, (2) whether housing improvements are cost-effective on a large scale, (3) questions of sustainability and maintaining access to materials and building expertise over time and (4) whether housing improvements can be included as long-term malaria solutions in control programs. Future work could aim to (1) incrementally improve housing as part of anti-malaria programs, (2) include malaria-prevention strategies in home-building and home-improving projects partnering with housing micro-finance institutions and (3) consider housing as part of IVM. The Center for Innovation in Shelter and Finance (CIS) exists to facilitate collaboration between public, private, and third sector actors in the market to develop sustainable and innovative housing solutions. Its vision is to serve as a place of knowledge, expertise, advice, and innovation, enabling poor families to acquire adequate housing. In conclusion, HFH advocates that malaria control programs should consider targeted housing improvements as a sustainable additional intervention to reduce transmission and that we can aim to 'Build Malaria Out'.

#### *Discussion*

People living in endemic regions of Africa do not see malaria as a problem and this must be considered when encouraging the improvement of homes to protect against malaria. Good housing can reduce standing water around the home and HFH can work with the entire community to achieve this. Housing does not relate simply to malaria but presents opportunities for dengue, respiratory disease and diarrhoea control. Not only must we consider the 'healthy home', but also housing as a basic human right.

#### ***Developing a framework for scaling-up housing interventions – Caroline Jones, KEMRI, Kenya***

The process of scaling-up interventions involves the following key actors: the innovation, the resource team, and the key players for innovation and adoption. The attributes of the intervention should be optimised (by involving the users in design), key stakeholders should be identified and engaged, a driving team for synthesis and advocacy should be created, and a scale-up strategy developed. Stakeholder analysis should be conducted to identify stakeholders at local, national and international level. Individuals can be drawn from each level to form stakeholder groups to liaise with the driving team. A trial of a new intervention should continually engage both the community and stakeholders.

#### *Discussion*

The success of malaria control is closely tied to the social environment. Using interventions such as housing, which are not specific health interventions, will not only complement the main interventions but also make malaria control more relevant to broader development agendas. It was suggested that housing may be more difficult to sell to donors as indicators and metrics may be more difficult to collect, however HFH has developed metrics that have been successful in attracting donor funding. Moreover, housing can help reduce reliance on donors.

***A preliminary evaluation of insecticide-impregnated ceiling nets in Western Kenya – John Lucas, Sumitomo***

A preliminary evaluation of insecticide-impregnated ceiling nets in Western Kenya was presented. Olyset® nets (2% permethrin) were cut and sewn into sheets and inserted into two houses in western Kenya. One control home was installed with untreated netting. Netting was secured by stapling it into walls below eaves. Overall, 10.5 x 5m netting was used for each home. Nets were installed in May 2010, left for nine months and then uninstalled. Fewer mosquitoes were collected in the screened homes with a possible residual effect after screening was removed and possible displacement of mosquitoes from the screened to unscreened homes. Findings have been published (Kawada et al., 2012. Jpn J Infect Dis, **65** : 243-246).

***Eave nets, windows and doors in western Kenya – Ole Skovmand, Intelligent Insect Control***

Work is ongoing to design house screening suited to western Kenya. Eave nets take 45 minutes and three people to install per house. The amount of net required corresponds to two to three bednets, depending on house size. Windows are easy to screen however doors are problematic; hanging nets over doors are viewed as ugly and nets begin to disintegrate, while insecticide-impregnated lamels are effective for a period of weeks or months but equally unpopular among residents, although the effect on cockroaches, flies and pests is appreciated. Suggestions for a better door screen are invited.

***Discussion and draft 2014 Work Plan***

The following draft work plan for 2014 was proposed: (1) engage with parties outside health sectors and (2) develop a position statement on housing. Additional suggestions were invited.

- It was decided that a position statement on housing was not necessary at this stage.
- The strength of RBM is its capacity to bring together partners from different sectors. The Lake Victoria Initiative is collaborating with UN-HABITAT and RBM and is a good example of cross-sectoral collaboration in housing and malaria. It will be productive to continue to engage with different partners until a core group of people interested in housing and malaria is identified.
- The typical cost of a new home was queried; costs vary by region and can be gauged by talking to local universities and architecture students. Building new homes can also generate income and the process thereby becomes a product itself.